

Innovative Methods of Improving PPE Practices



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March 26, 2013
Washington D.C.



This meeting is being recorded

Survey & Effectiveness of Pesticide Application Equipment Cleanout Methods

HICAHS Research Project



Thia Walker – CSU Extension Specialist

Dr. Delphine Farmer – CSU, Department of Chemistry

2011 S.A.F.E. Fly-In Tank Samples

Sample Number P100312 ug/L (ppb)

Compound	Ex. labeled products	2	3	4	5	6	7	8	9	10	11	12
2,4-D			79	108	441	51	160	44	13	10860	572	30
Atrazine	Aatrex, Guardsman Maxx,											72
Azoxystrobin	Quilt, Quadris,			104				51	35			
Bifenthrin	Capture,				42344		1171			29		
Chlorpyrifos	Lorsban	113	117	50	730	151		571	133	1441	283	1268
Chlorthalonil	Daconil			72								
Cyhalothrin lambda	Warrior									26		
Dicamba			63							829	146	
Difenoconazole	Cruiser Maxx, Quadris Top					26						
Dimethoate	Dimethoate Insecticide	46		197	51	35000	90		1448	48	75	
Glyphosate	Roundup				13286	672			1300	196	123	150
Imazapyr	Arsenal, Lightening, Mojave		380									
Malathion	Malathion					17						
Metconazole	Caramba, Headlin AMP					15		12				
Methomyl	Lannate, Nudrin	26					18	442				
Permethrins					58					96		
Picloram	Tordon			10	11							
Tebuconazole	Folicur					14		30	23		15	
Thymol	antibacterial disinfectant	78	45				36					

Theory vs Reality.....



Figure 1. Cleaning a Sprayer (Photo credit: USDA).

We don't have a good idea of how spray equipment is getting cleaned in the real world!

- Part 1: Survey
 - Demographic info & opinions on cleaning equipment
 - Info about the sprayer used
 - Info on tank cleaning procedure
- Part 2: Collect samples during normal cleanout (1 time)
 - Volunteer to participate - 'contact survey'
 - What they get/ What we get





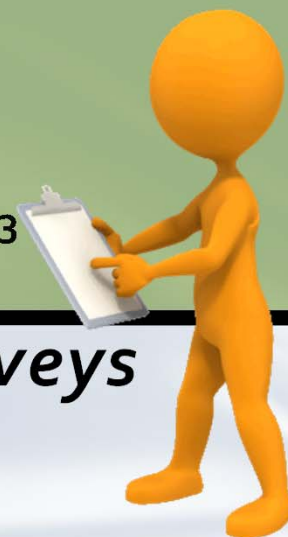
Part 2:
Volunteers will be
provided with
PPE to protect
them from
possible
pesticide exposure
during the
sampling process



Received 98 surveys to date!

Part 1: Results

as of March 20th, 2013



411 Completed Equipment Cleanout Surveys

Private Applicators

93% Weed Control

44% Plant Disease Control

63% Insect Control

30% Right-Of-Way

Commercial Applicators

57% Ag Weed Control

41% Ag Insect Control

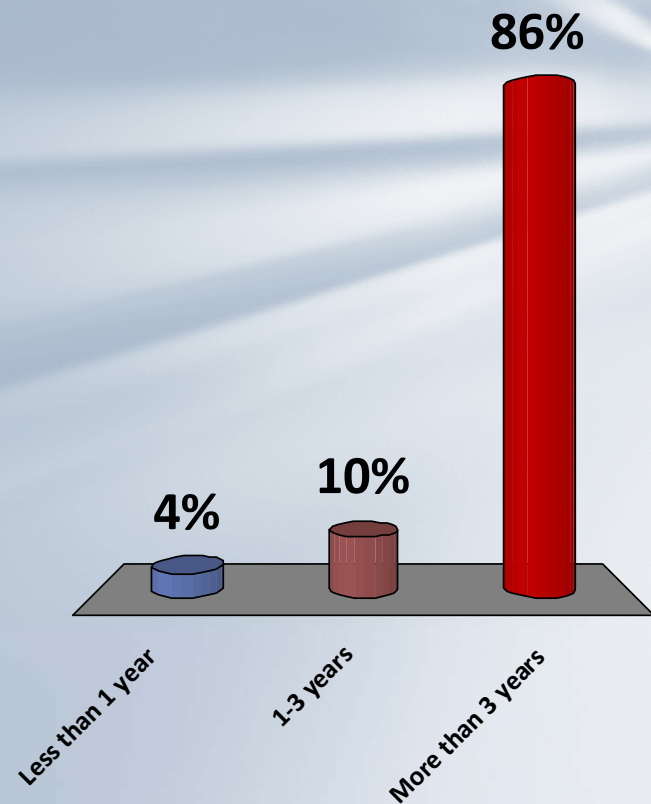
39% T/O Weed Control

26% T/O Insect Control

26% Right-of-Way

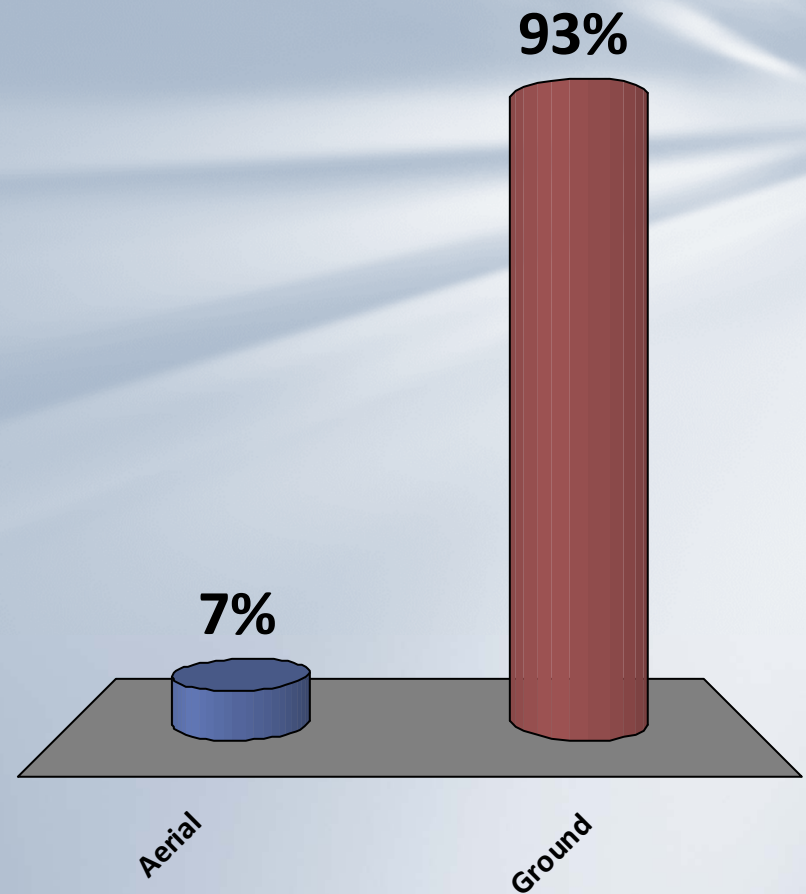
How many years of experience do you have making pesticide applications since obtaining your pesticide applicator license?

- A. Less than 1 year
- B. 1-3 years
- C. More than 3 years



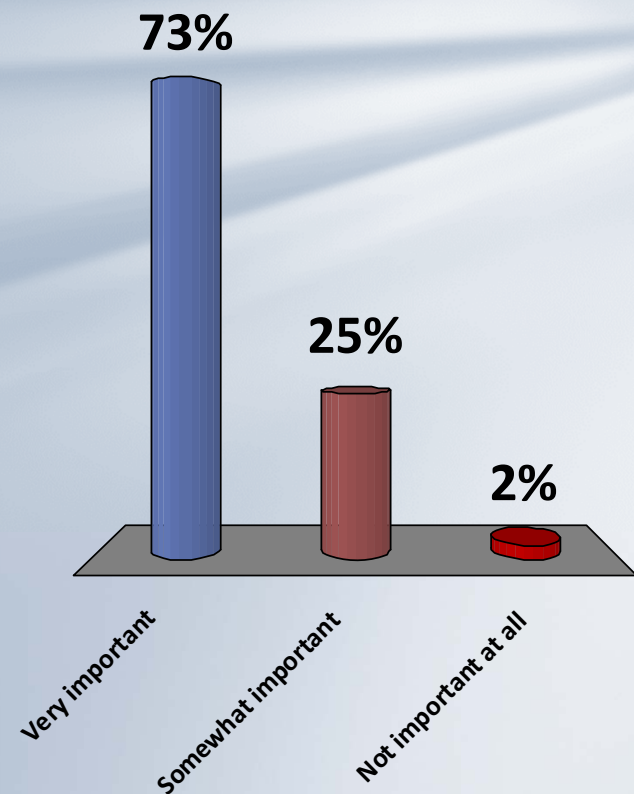
What type of applications do you normally make?

1. Aerial
2. Ground



In your opinion, how important is cleaning your application spray tank to your operation?

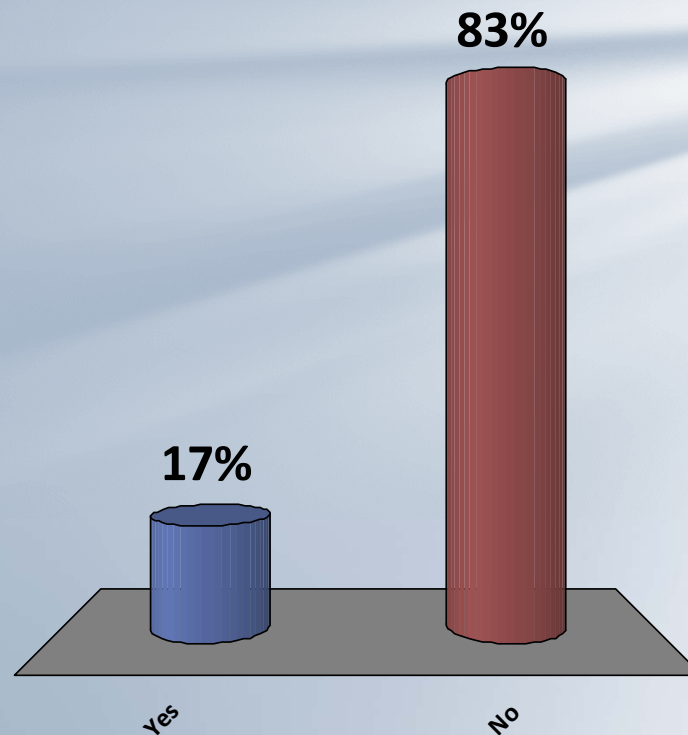
1. Very important
2. Somewhat important
3. Not important at all



At any time in the last 5 years, have you ever experienced left over residues in the spray tank causing symptoms to off-target plants?

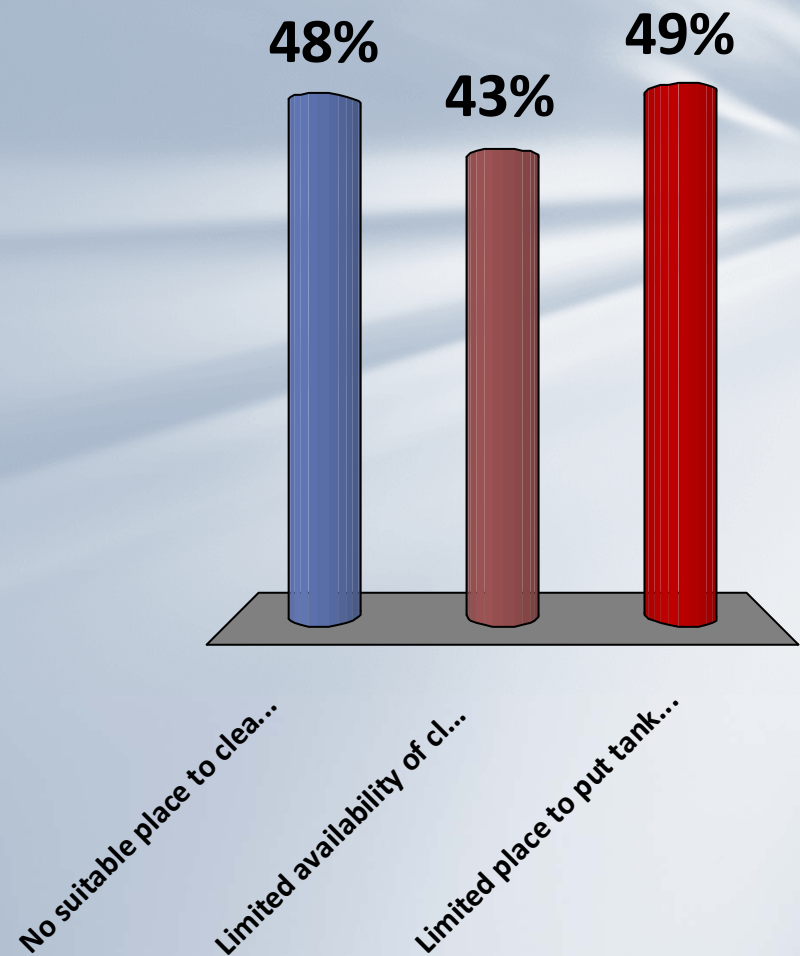
1. Yes

2. No



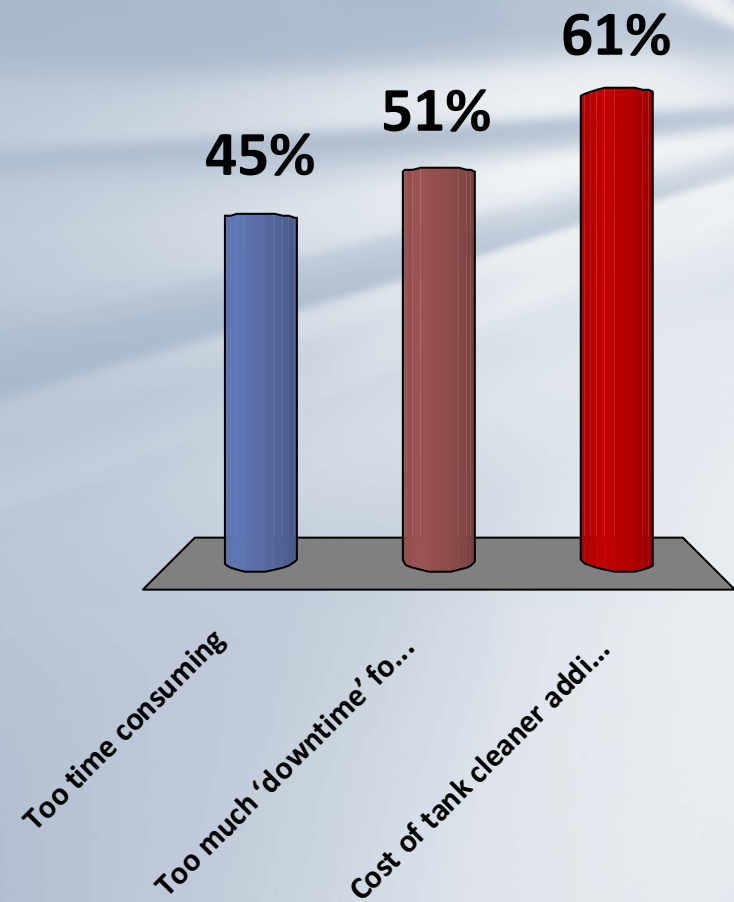
Very important factors which limit your ability to clean out your spray equipment

1. No suitable place to clean sprayer
2. Limited availability of clean water
3. Limited place to put tank rinsates



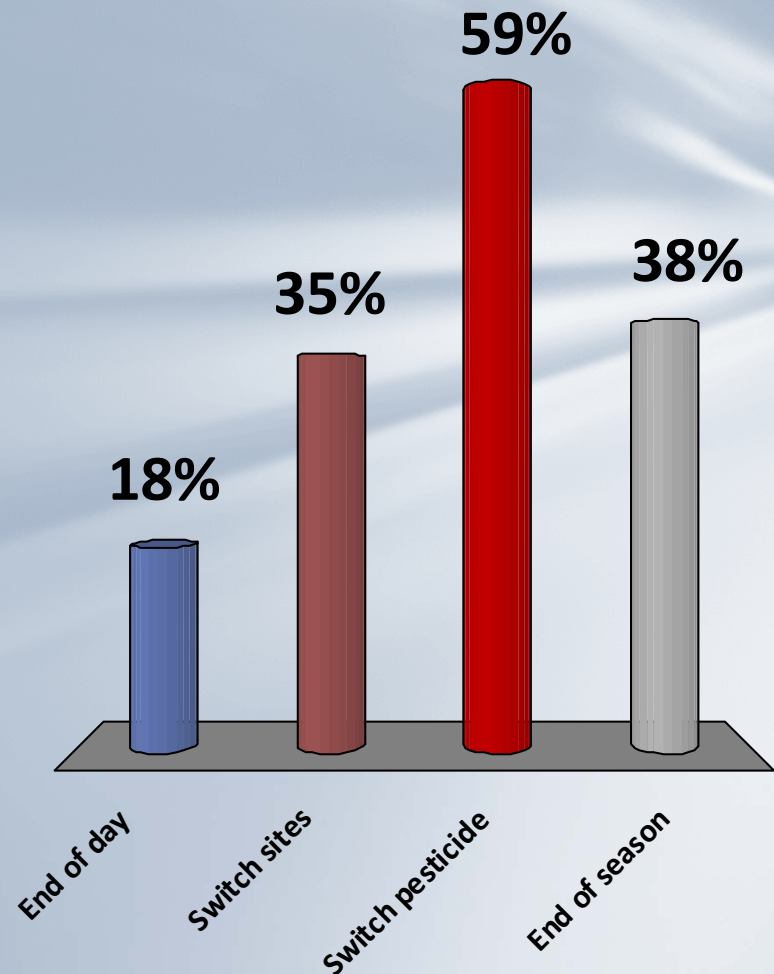
Factors which are NOT important in limiting abilities to clean out spray equipment

1. Too time consuming
2. Too much 'downtime' for equipment
3. Cost of tank cleaner additives



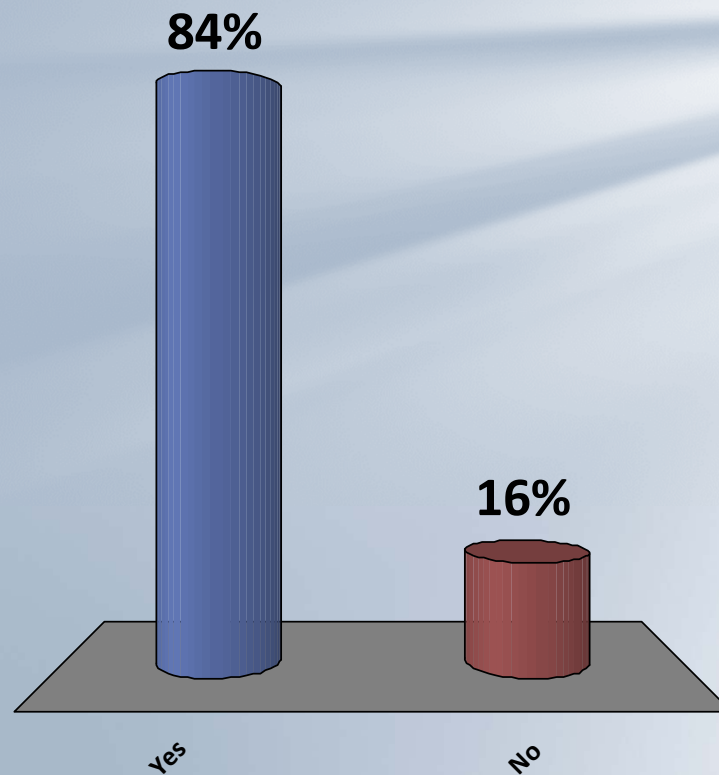
How often do you clean your sprayer?

1. End of each day used
2. When switching sites
3. When switching type of pesticide
4. End of season



Do you wear Personal Protective Equipment (PPE) when cleaning the sprayer?

1. Yes
2. No



Who would be impacted by pesticide residues remaining after cleaning?



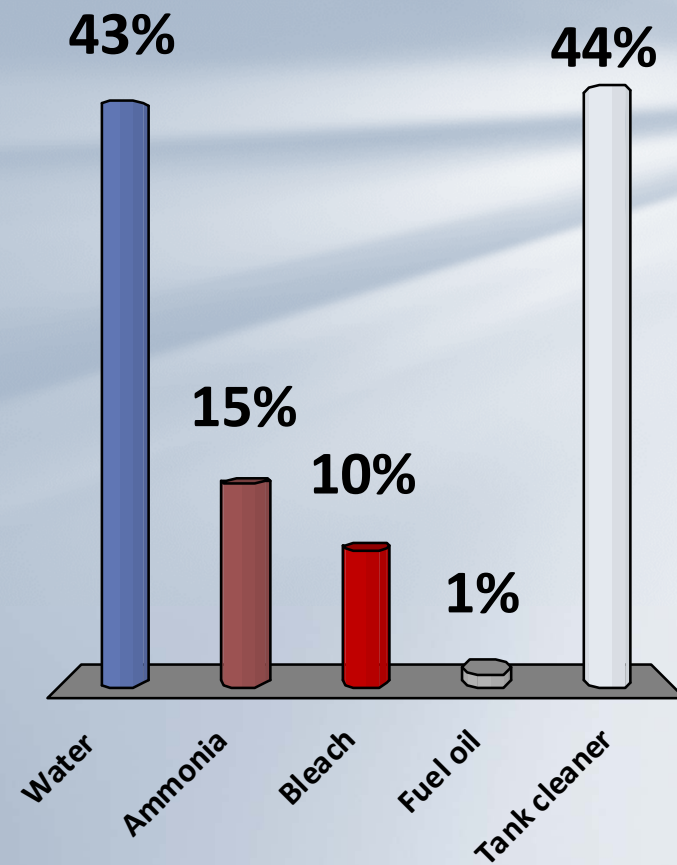
Handlers/Applicators
mix, load, apply, clean or
repair equipment

**And anyone else
who works on the
equipment!**



Which of the following do you routinely add when cleaning the inside of the spray tank?

1. Water only
2. Ammonia
3. Chlorine bleach
4. Fuel oil or kerosene
5. Commercial tank cleaner



Still need to use PPE!

Where do you get information?

Label

Apron?

Goggles?

Maybe a

respirator?

Clarity[®]
herbicide

Precautionary Statements

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION

Causes moderate eye irritation. Harmful if swallowed or absorbed through skin. Avoid contact with skin, eyes or clothing.

Personal Protective Equipment (PPE)

Some materials that are chemical-resistant to this product are nitrile rubber and butyl rubber. If you want more options, follow the instructions for **Category C** on an EPA chemical-resistance category selection chart.

All mixers, loaders, and applicators and other handlers must wear:

- Long-sleeved shirt and long pants
- Chemical-resistant gloves (except for pilots)
- Shoes plus socks

For weed control in
corn, cotton, soybeans,
sorghum, sugarcane,
rangeland, and sugarcane

Cle
Cle
de
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by using a strong
g, according to the
e rinsing the equip-
uct.



Tank & Equipment Cleaner

AGRICULTURAL • COMMERCIAL • INDUSTRIAL
KEEP OUT OF REACH OF CHILDREN

CAUTION

NET CONTENTS: 1 POUND (454 g)



Loveland
PRODUCTS

Loveland Products, Inc. • PO Box 1286 • Greeley, CO 80632

CAUTION: Harmful if swallowed, absorbed through skin, or inhaled. Avoid contact with skin, eyes or clothing. Wear chemical resistant gloves. **Personal Protective Equipment:** Wear chemical-resistant gloves, Long-sleeved shirt, long pants and socks.

FIRST AID: **If in eyes:** Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice. **If on skin or clothing:** Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice. **If swallowed:** Call a poison control center or doctor immediately for treatment advice. Have a person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or doctor. Do not give anything by mouth to an unconscious person. **If inhaled:** Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible. Call a poison control center or doctor for further treatment advice.

FOR A MEDICAL EMERGENCY INVOLVING THIS PRODUCT CALL: 1-866-944-8585.

Have the product container or label with you when calling a poison control center or doctor, or going for treatment.

GENERAL: *TANK & EQUIPMENT CLEANER* is an all purpose cleaner for flushing spray tanks, hoses, booms, filters, screens and nozzles when changing chemicals and prior to equipment storage. *TANK & EQUIPMENT CLEANER* will remove chemical deposits including rust, neutralize acid-based herbicides including 2,4-D, and leave a protective film if not rinsed before extended storage. *TANK & EQUIPMENT CLEANER* has been shown effective to solubilize and remove sulfonyleurea herbicides.

DIRECTIONS FOR USE: *TANK & EQUIPMENT CLEANER* should be used at the concentration equivalent of 1 pound per 100 US gallons (120 grams per 100 litres) of water for general cleaning and most pesticides. For pesticides demonstrating difficulty to clean (i.e. sulfonyleurea herbicides),

WIPEOUT®

SPRAY TANK CLEANER

KEEP OUT OF REACH OF CHILDREN

WARNING

Eye contact with product will cause burns and irritation. Avoid eye contact with product at all times. Effects of skin contact may include burns and irritation. Avoid prolonged and unnecessary skin contact with product. May cause burning pain in mouth, throat and abdomen and coughing and constriction of the throat, followed by nausea, vomiting, and diarrhea. Do not taste or swallow product. May cause respiratory tract irritation, coughing, and difficulty breathing.

For help in chemical emergencies involving spill, leak, fire or exposure, call toll free 1-800-424-9300.

See Inside Panel for Additional Precautionary Statements.

SN CLB—07016C-010606

NET CONTENTS:

MANUFACTURED FOR
HELENA CHEMICAL COMPANY
225 SCHILLING BOULEVARD, SUITE 300
COLLIERVILLE, TN 38017

PRECAUTIONARY STATEMENT

WARNING

BEFORE USING THIS PRODUCT READ ALL PRECAUTIONS, DIRECTIONS FOR USE, CONDITIONS OF SALE-LIMITED WARRANTY AND LIMITATIONS OF LIABILITY AND REMEDIES.

WHAT TO DO IN CASE OF CONTACT:

IF IN EYES: Hold eye open and rinse slowly and gently with water for 15 – 20 minutes.

Remove contact lenses if present, after the first 5 minutes, then continue rinsing eye.

Have the product container with you when calling a poison control center or doctor.

IF ON SKIN OR CLOTHING: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15 – 20 minutes.

IF SWALLOWED: Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give anything by mouth to an unconscious person.

IF INHALED: Move victim to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible.

If there is accidental exposure to the spray solution containing pesticides, follow the "Statement of Practical Treatment/First Aid" on the pesticide label.

KLEEN-UP™

Liquid Tank Cleaner

CONTAINS: Nonionic and amphoteric surfactants, chelating and emulsifying agents, monoethanolamine, inorganic hydroxides, and formulation aids.
All ingredients approved for use under 40 CFR 180.1001 (c).

DANGER: CORROSIVE
KEEP OUT OF REACH OF CHILDREN
DO NOT TAKE INTERNALLY

FOR USE BY TRAINED PERSONNEL ONLY

KLEEN-UP is designed for cleaning tanks, lines and nozzles to remove residues left from pesticides and fertilizers.

KLEEN-UP is a DUPONT-approved liquid spray tank cleaner, formulated to bond pesticide residues to the rinse water solution for complete purging. Because rinsate may be sprayed on growing crops it is important to use a spray tank cleaner that is approved for use on growing crops. KLEEN-UP is approved for this use.

KLEEN-UP also removes large amounts of scale and rust that could plug screens and nozzles or expose hidden leaks. Do not use KLEEN-UP on nonferrous metals, such as soft aluminum, copper and brass.

PRECAUTIONARY STATEMENTS

Before using this product, read the entire label, including the conditions of sale.

This product contains caustic alkali which may cause severe burns to skin and eyes. Harmful or fatal if swallowed. Severity of damage or injury increases with length of contact time. Avoid breathing of spray or mists. Do not get in eyes, on skin or clothing. Wear rubber gloves and eye protection.

ROSEN's Cleaner

- Danger – Corrosive
- Contents
- Precautionary Statements
- For Use by Trained Personnel Only



The Clorox Company

1221 Broadway
Oakland, CA 94612
Tel. (510) 271-7000

I Product:		CLOROX REGULAR-BLEACH
Description:		CLEAR, LIGHT YELLOW LIQUID WITH A CHARA
Other Designations		Distributor
Clorox Bleach EPA Reg. No. 5813-50		Clorox Sales Company 1221 Broadway Oakland, CA 94612

II Health Hazard Data

DANGER: CORROSIVE. May cause severe irritation or damage to eyes and skin. Vapor or mist may irritate. Harmful if swallowed. Keep out of reach of children.

Some clinical reports suggest a low potential for sensitization upon exaggerated exposure to sodium hypochlorite if skin damage (e.g., irritation) occurs during exposure. Under normal consumer use conditions the likelihood of any adverse health effects are low.

Medical conditions that may be aggravated by exposure to high concentrations of vapor or mist: heart conditions or chronic respiratory problems such as asthma, emphysema, chronic bronchitis or obstructive lung disease.

III Hazard

Ingredient

Sodium hypocl
CAS# 76

Sodium hydrox
CAS# 13

We've come a long way.....



But we still have a ways to go!.....

We need to do additional education on wearing PPE while cleaning equipment!

Where do you find what PPE to wear during equipment cleaning?

The label?

The tank cleaner label?

What about pesticide mixtures?



*The job is NOT done until the sprayer is cleaned...
keep your PPE on for the entire job!*

If you need more information...

About the survey and/or collecting samples:

Thia Walker (719) 691-9118 or thia.walker@colostate.edu

About the sample analysis:

Dr. Delphine Farmer delphine.farmer@colostate.edu



Thia Walker – CSU Extension Specialist

Dr. Delphine Farmer – CSU, Department of Chemistry

Designing Change: A Case Study

Implementing design process
in improving PPE standards and compliance rates

fARMOR

Bringing far more to the farm

Michele Lea Proctor,
Master of Industrial Design

North Carolina AgrAbility Partnership-
North Carolina Agromedicine Institute

NIOSH PPE Stake Holders Meeting -Washington, DC -March 26, 2013



Case Study



Poultry farmer (Dad) in
half-face cartridge respirator



Poultry farmer (brother) in
full-face cartridge respirator

Recognizing A Problem

Observations:

- Lack of knowledge on the subject, risks and other PPE options
- Lack of PPE suitable for specific farming needs- industry admission
- Discomfort- heat (also risk of stroke), condensation, contact with sensitive facial skin, uncomfortable materials
- Hygiene- dirty jobs, possibility of sharing, poor or no storage
- Not cool... Personal image and psychosocial issues
- Reduced visibility- big problem for equipment or confined space users
- Older farmers- certain health conditions require more costly units
- Durability- inability to work as hard as the user
- Inconvenience- hassle to put on, interferes with cell phone use
- Interference with other PPE or face wear- goggles, earplugs, facial hair

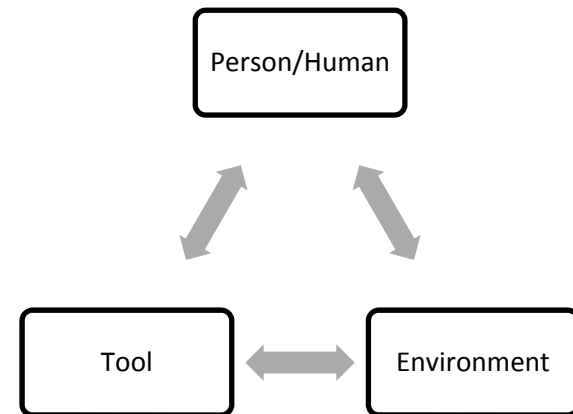
***FARMERS ARE BUSINESS OWNERS/OPERATORS.**
They will eliminate any source of productivity or function loss, regardless of elevated risk.*



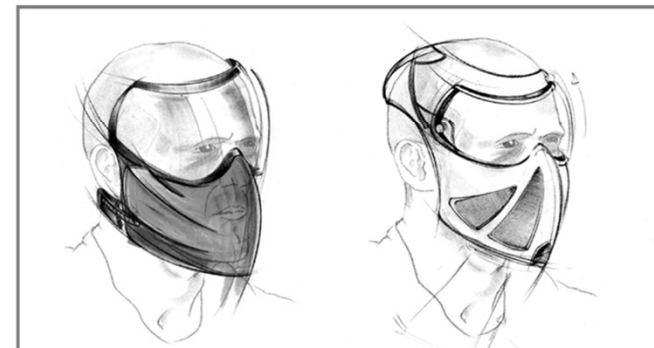
The Design Process

+ Making the Human Connection

- **Examine** the situation
- **Understand** the variables
- **Analyze** what's working and what isn't
- **Inspiration** + reference
- **Ideation + Styling**
 - Making the **Human Connection**
 - Design is not to be confused with decorating
- **Distilling** down to the end product



fARMOR
Respirator



Final Design + Next Steps

fARMOR
Bringing far more to the farm

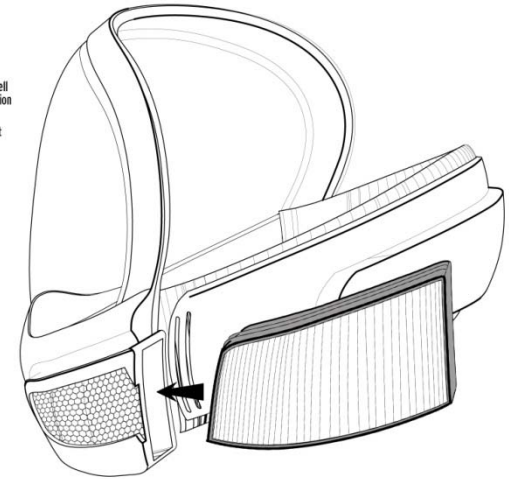


So You Have a New Design: *Now What?*

- Protecting Your Intellectual Property: Patenting
- Establish funding for continued development
- Complete Market Analysis: evaluation of industry-specific use and broader applications
How with this affect your market and more?

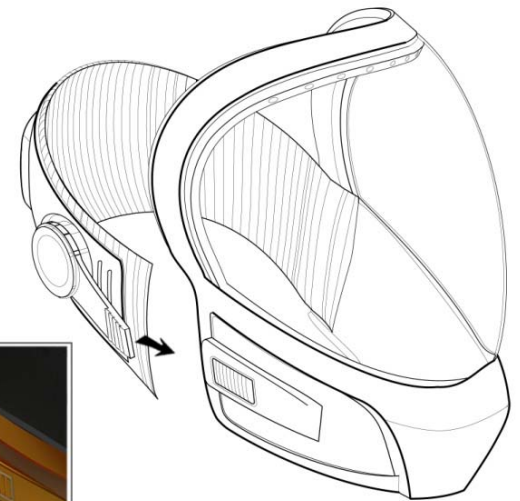
FARMOR Respirator

- Powered air supply is tiny but powerful at 10.7 cf/m
- Adaptable for existing popular-model carbon cartridge filter as well as "newer, compact filter technology to provide the same protection as existing cartridge respirators
- Filtered air is directed over user's face for cooling effect
- Exhaled air is directed down and away from the face to prevent fogging
- 4 small LifePO4 rechargeable batteries are safer, containing no heavy metals, are more environmentally friendly, and lighter weight than traditional rechargeable batteries
- Slots in shell over ears provides partial hearing protection to allow some sound, such as while using heavy equipment, but still allows for additional use of additional protection such as ear plugs.



FARMOR Respirator

- Self-contained, one piece unit
- Full face protection
- Minimal contact with face
- Single hinge with ratcheting, quick release latch
- Bluetooth capabilities for mobile phone use
- Wide shield for maximum visibility
- Double-paned, thermal shield prevents fogging and provides impact protection
- Removable, machine washable foam lining
- Powered air supply is tiny but powerful at 10 cf/m
- Air directed over user's face for cooling effect
- O-shaped silicone seal around face creates double seal effect when put into compression
- Use of silicone instead of rubber increases user comfort—less rigid and prevents gouging into face



So You Have a New Design: *Now What?*

- Prototyping- 3D, proof of concept, form study, testing
- Testing, Testing- NIOSH approval and verifying value and safety of product
- Manufacturing: preparing for mass production
- Marketing- Industry Integration:
Established Name Brands or Flying Solo

fARMOR
Respirator

Storage Station:

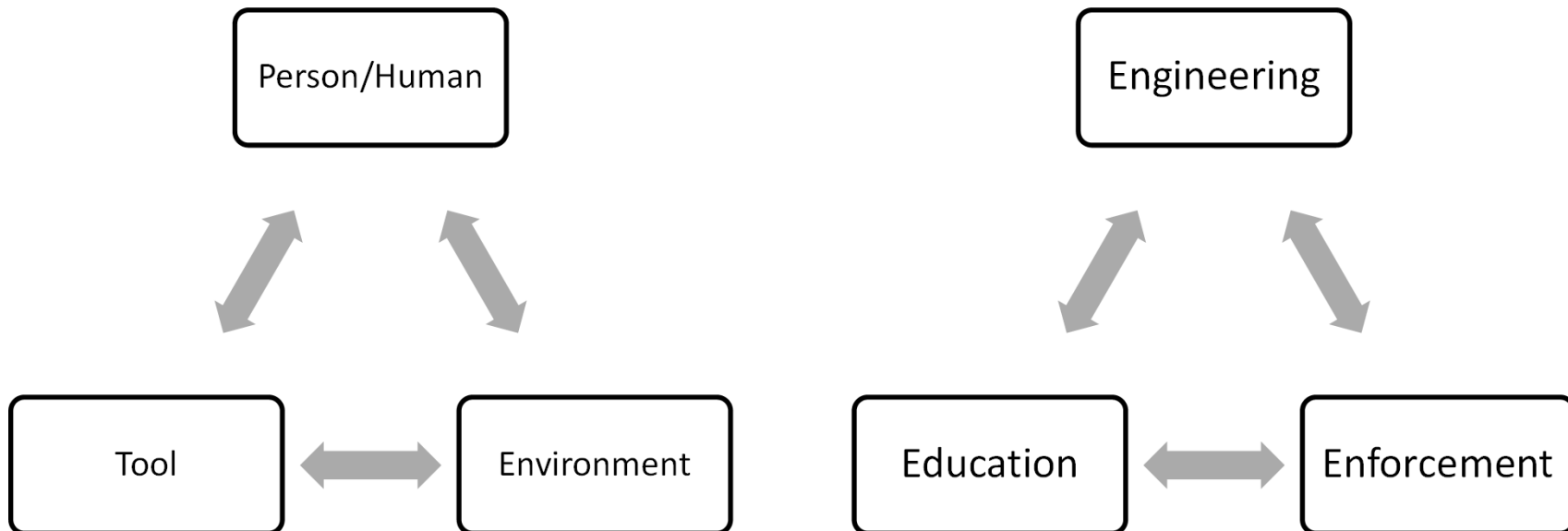
- Only mask on the market that comes with rigid, protective storage and charging station, ideal for agricultural and commercial environments
- Recharging is as easy as hanging up the respirator when not in use thanks to wireless charging pad
- The sealed, acrylic casing provides protection and keeps the respirator clean and prolongs life of filter & respirator
- Plugs in to any standard 110w outlet
- Simple wall mount with four screws or adhesive strips



fARMOR
Respirator



The Model



"The 3 E's of Safety", Safety and Health for Production Agriculture, pg. 112. Dennis J. Murphy. 1992.

Bottom Line:

- Balance is essential.
- Design is the common thread in this relationship.
- Implementing Design Process in Improving PPE products= better compliance due to improved human connection

Questions?

**Michele Lea Proctor,
Master of Industrial Design**

127 D.S. Weaver Labs, Box 7625, NCSU
Raleigh, North Carolina 27695
coordinator@ncagrability.com
828-302-5442

fARMOR
Bringing far more to the farm



Responding to EPA's Risk Mitigation Measures for Soil Fumigants

Robin Tutor-Marcom, MPH, OTR/L
2013 Pesticide Handler Personal Protective Technology
Stakeholders Meeting
March 26, 2013



Implementation of Reregistration Eligibility Decisions (REDs)

Phase 1: 2010 Labels – 2011 Implementation

- Restricted use classification
- Re-entry restrictions
- Safety information for handlers
- Mandatory good agricultural practices (GAPs)
- Fumigant management plans
- **Handler respiratory protection**
 - **handlers have to stop work or use respirators if air concentrations exceed acceptable limits.**
 - **At least 1-2 handlers (depending on product) must have air-purifying respirator available and have been fit-tested, trained, and medically cleared for respirator use**

http://www.epa.gov/pesticides/reregistration/soil_fumigants/

Addressing Need Through Partnership



The NC Department of Agriculture, Pesticides Section – Structural Pest Control & Pesticides Division estimates that there are at least 2200 farms in the state that use soil fumigants in the production of tobacco, peanuts, bell peppers, squash, watermelons, strawberries, tobacco, peanuts, cotton, sweet potatoes, and tomatoes

Risk Mitigation Measures Project

Goals:

- Provide training & technical assistance to NC farms in implementation of reregistration eligibility decisions
- Assist farms in obtaining necessary medical clearance & respirator fit testing
- Provide cost share funds to farms to decrease economic impact of implementing reregistration eligibility decisions



B

SATURDAY, March 12, 2011

The Daily Reflector

LOCAL & STATE

Farmers receive respirators to comply with EPA

BY K.J. WILLIAMS
The Daily Reflector

Tobacco growers are getting ready to prepare their fields for planting, and this year that means getting themselves ready with fittings for respirators.

A change to the labeling used on some fumigants has farmers lining up for fittings for the full-face respirators, now necessary for growers if they experience any eye irritation while wearing a half-mask. The new Environmental Protection Agency requirement took effect Dec. 31.

James Corbett, 48, has farmed his whole life in Edgecombe County.

After passing the test on Friday at the Pitt County Agricultural Center, he was handed a respira-

"It (wearing a respirator) used to be like seatbelts. It was your choice. Now it's required."

James Corbett
farmer in Edgecombe County

tor.

"This is your safety; the same thing as firefighters," he said. "It used to be like seatbelts. It was your choice. Now it's required."

Corbett likely will only use the mask occasionally when he fumigates his tobacco fields, he said. He also grows row crops.

Fittings continue today starting at 8 a.m.

George Elderbaum is providing the testing as a contractor for the N.C. Agromedicine Institute, an organization that's a partner-

ship between East Carolina University, N.C. State University and N.C. Agricultural & Technical State University.

"Every face is a little different," he said while testing the fit on the respirator worn by Beaufort County lifelong farmer Jimmy Hardison.

Using an analyzer machine with tubes hooked into Hardison's mask, Elderbaum took readings while giving Hardison in-

See FARMERS, B3



RHETT BUTLER/THE DAILY REFLECTOR

ERNEST WINTSTEAD tries on a respirator mask during a fitting session at the Cooperative Extension Service on Friday.

- >1300 farmers completed respirator fit testing at events conducted by the Institute or coordinated with other agencies
- Farmers received hands-on training in respirator use, care, and storage

Service or Equipment	Approximate Retail Cost	RMM Project Immediate Cost Share
On-line medical clearance	25.00	12.50
Blood Pressure & Spirometry(lung function)	25.00	12.50
Respirator Fit Test	25.00	12.50
Full Face Respirator	130.00	45.00
Cartridges	15.00	7.50
Total	220.00	90.00



- ~ \$57,000 in immediate cost share to farmers
- ~\$25,000 in additional cost share reimbursements paid to farmers attending other events and/or purchasing equipment

Other Activities

- Arrangements with Grainger for farmers to purchase equipment at state contract rates
- Provider list for medical clearance and respirator fit services in NC, SC, & VA
- Respirator sample kits to occupational health companies



Risk Mitigation Measures II



Building on-farm capacity for qualitative fit testing

Questions



Barbara Gallagher, RN
AgriSafe Nurse Coordinator
NC Agromedicine Institute
1157 VOA Site C Road
Greenville, NC 27834

Tel: 252.744.1023 or 1-855-AGR-ISAF

agrisafenc@ecu.edu

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Greenville, NC 27834

Tel: 252.744.1008 or 1-855-AGR-ISAF

tutorr@ecu.edu



An Ethnography-Informed Mobile Health Intervention for Mexican Immigrant Farmworkers

¡Protéjase!

Sandra Gonzalez de Del Pilar, MA
Project Associate, BioQUAL Lab
Department of Biobehavioral Health
Penn State University



Background (5 minutes)

- ☑ Health Risks of Agricultural Field Workers
- ☑ Obstacles of PPE Use
- ☑ Need for Practical PPE Use
- ☑ Value of Ethnographic Tools (First-hand knowledge)

Our Research (5 minutes)

- ☑ Research Aims and Methods
- ☑ Community Partnership (TMC Migrant Head Start)
- ☑ Intervention Description
- ☑ Future Plans

Discussion/Questions (5 minutes)

Background

Risk of pesticide exposure among field workers may be underestimated.

Field workers undergo similar amounts of pesticide exposure as those who spray, mix, or load pesticides

- ❖ Greater pesticide levels in house dust of field workers compared to sprayers.
- ❖ No difference in urine pesticide levels of field workers compared to sprayers.

Coronado et al 2003; 2008



Background

PPE use is critical to

- * Reduce pesticide exposure among field workers**

PPE use is critical among field workers

- * Field workers may experience similar exposures as those who spray, mix, or load pesticides.**

Background

BENEFITS **VS** **BARRIERS**

PPE Provides Field Workers:

- ☑ Barrier between skin and pesticide residue
- ☑ Easy to implement option for protection
- ☑ Cost-efficient option for safety

PPE is Difficult to Use by Field Workers:

- ❌ Hot
- ❌ Uncomfortable
- ❌ Slows Work Pace
- ❌ Field workers often paid by yield

How do we emphasize the benefits, while overcoming barriers to PPE use?

Background

Ethnographic Tools May Help!

- ☑ Traditional research focuses on linear self-regulatory (knowledge = behavior change), but our research is driven by culture, meaning, common sense, and emotion.
- ☑ We are informed by over 4832 hours of ethnography to understand farmworkers' decision-making for PPE use.

Background

Ethnographic Tools May Help (#2):

- ☑ Behavior change occurs only with motivation from self.
- ☑ The “self” determines what matters.
- ☑ What matters is the body (health), biography (family, education, work) and conceptions (socio-cultural practices).
- ☑ Farmworkers engage motivations of self, negotiating between:
 - Bodies/Health – perceived vulnerability to pesticides
 - Biographies – importance of work and family demands
 - Conceptions/Culture – illness beliefs, other cultural practices

Background

Example of Ethnographic Work

“That is why I do not wear glasses or gloves when working by contract. What happens is that we are going up and going down [the ladders] and we want to pick the fruit faster so that we can get paid more. And, well, we are going to leave the glasses and the gloves stuck up there in the branches. But by the hour we always use the gloves and the glasses.”

Snipes S.A., Thompson, B., O'Connor, K., Shell-Duncan, B., King, D., Herrera, A.P., Navarro, B. . (2009) American Journal of Public Health 99:s16-s21.

Our Research:

Ethnography-Informed Mobile Health Intervention

Specific Aims:

- 1) To develop an ethnography-informed pesticide safety intervention that promotes increased use of novel forms of PPE.
- 2) To evaluate the effectiveness of intervention delivery (mobile smart phones) to increase farmworkers' use of PPE.
- 3) To determine the relationship between PPE use and pesticide exposure, determined by analysis of organophosphate pesticides in saliva.

PPE Intervention

❖ **Research Setting**

Rio Grande Valley of Texas

- Located along the Texas-Mexico Border
- Nearly 75% of residents are, or have been farmworkers
- Over 80% of USA Farmworkers are of Mexican origin

❖ **Community-Based Partnership**

- Texas Migrant Council (now Teaching and Mentoring Communities) and Seasonal Head Start
- Identified 60 farmworkers for pilot study, provided meeting facilities and help with recruitment and retention.

PPE Intervention

Pilot Testing (February – April 2013)



- 1) Sample of 60 Farmworkers
- 2) Distribute Novel PPE
- 3) Survey Daily Use of PPE
- 4) Deliver Safety Messages
 - Tailored Based on PPE Use
 - Motivate PPE Use
 - Overcome Barriers
- 5) Cultural Motivations Used in Messaging (e.g. Family, folk illness, etc.)
- 6) Biomarker assessment: Collection of saliva samples
- 7) 30 Day Testing Period

PPE Intervention



3 pairs of touch sensitive gloves;
cooling/breathable fabric









2 pairs of water resistant shirts
with cooling technology and
ventilation



3 pairs of Fog-proof safety glasses
(tinted)

PPE was thoroughly pre-tested

Table 2. PPE Intervention - Personal Protective Equipment Prototypes

Personal Protective Equipment Prototypes	PPE Picture	Barriers that are overcome with PPE	PPE Prototype Technical Details	Farmworker Quotes
Gloves				
Ninja Lite Blue Nylon Shell		<ol style="list-style-type: none"> 1. Lightweight 2. Comfort: dexterity and flexibility for tasks that require fast and precise movements 3. Tactile sensitivity for handling of small and or delicate fruit 4. Breathability of glove 5. Economic (\$2.99/pair) 	Constructed of a skin tight athletic grade blue nylon shell with feather-light polyurethane coating on its palm and fingertips. This combination provides a second skin sensitivity with high abrasion protection.	<p>"If you are not used to using gloves, these are good. I would use them for picking onions."</p> <p>"These gloves feel snug and tight, they don't bulge in the middle, you can do things with small thing, and get the job done."</p> <p>"These gloves fit better and are more comfortable, they would be good for jobs that require handling small fruit picking."</p>
Ansell Cut Resistant Gloves with Nitrile Foam Coating		<ol style="list-style-type: none"> 1. Cut resistant 2. Comfort: flexibility and dexterity for tasks that require precision while handling sharp plants, knives or other objects 3. Tactile sensitivity 4. Lightweight 5. Durable 	Nitrile foam coating that is lightweight and cut resistant. New Kevlar® stretch armor technology make these gloves extremely flexible. Provide a strong grip with excellent tactile sensitivity, dexterity and comfort. Level 4 cut protection.	<p>"These gloves are good when working pulling weeds, or tough jobs, the texture is tougher."</p> <p>"These gloves are perfect for working with onions, asparagus and they have ventilation on top."</p> <p>"These gloves are more durable and resistant to the demands of the work."</p>
Eye wear				
Goggles –Rattler Silver temple clear indoor/outdoor anti-fog lens		<ol style="list-style-type: none"> 1. Fit and Comfort: non-slip, anti-fog lense, various tints of lenses, adjustable 2. Lightweight 3. Anti-scratch 4. Look of glasses 5. Protect eyes from dust, small debris, eye injuries 6. Durable 	Goggles feature interchangeable 3-position temples and an adjustable head band. Head band with hook and loop closure can be adjusted with one hand while wearing; Also features full length, non-slip temple sleeves for comfort and grip. Anti-fog lens. Duramass® scratch-resistant coating.	<p>"When the wind is blowing these goggles are better. If you are working with onions it will protect your eyes from the dirt blowing."</p> <p>"I like the insulation in the inside of the goggle."</p> <p>"I like that they have the strap as an option. When you bend down they won't fall."</p> <p>"I like the soft protection in the inside of the goggles and that they won't fall."</p>
Safety glasses –BearKat Clear Anti-fog lens		<ol style="list-style-type: none"> 1. Comfort: non slip, anti-fog, visibility 2. Lightweight 3. High impact protection 4. Protection from dust, small debris, eye injuries 5. Durable 6. Economic (\$2.49) 	Single wraparound lens design; Flexible temple design; Polycarbonate lens; Non-slip rubber head grips ;Anti-fog; Filters 99% of U.V. radiation; Also comes in tinted.	<p>"These glasses are good for work like picking onions. You want to be able to 'see' what you are doing. It is important to protect your eyes from the dust".</p> <p>"If you are in the fields you need this clear glasses."</p>
Long Sleeve Shirts				
Columbia Insight Ice T-shirt		<ol style="list-style-type: none"> 1. Fit and Comfort: lightweight, breathable, quick-dry, flexibility 2. UV rays protection 3. Look of long sleeve shirt (looks good, and is protective) 	Columbia Men's Insight Ice™ Long Sleeve Crew includes built-in UPF 15 sun protection and advanced cooling technology uses sweat to trigger a chemical reaction that actively lowers body temperature of the fabric; Gusset detail provides maximum mobility.	<p>"This shirt fits better and it feels comfortable."</p> <p>"I like this shirt, it is light and sporty."</p> <p>"I would use this shirt when working between grooves because it feels more snug and it would not get caught in the plants, which can happen if the shirt is too long."</p> <p>"It looks like a soccer shirt!"</p>
Dakota Grizzly Kenyon Long sleeve shirt		<ol style="list-style-type: none"> 1. Fit and Comfort: lightweight, breathable, quick-dry 2. UV rays protection 3. Look of long sleeve shirt (looks good and is protective) 	Features Tech Threads fabric for moisture-wicking, breathable and quick-dry performance for cool comfort; UV protection; Mesh back yoke and side zip mesh vents for added breathability; Roll neck sun protection; collar.	<p>"I like this shirt because it has ventilation and it offers protection."</p> <p>"I would pick this shirt because it protects you all the way to the wrist from the neck, it is comfortable, and you can put your supplies and glasses in the pockets and it gives you access."</p> <p>"I like the shirt because it is water resistant"</p> <p>"You don't feel the sun with this shirt."</p> <p>"It does work! I poured water on it and it doesn't"</p>

Our Future:

Data Analyses and Expansion of Intervention

Future Testing:

1. Refine intervention based on pilot data
2. Partner with TMC Migrant Head Start for large scale trial and testing
3. Submit proposal for NIH funding June 2013 for optimized intervention

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- ❖ **Students (PSU, BioQUAL):** Sienna George, Daniela Riveros, Amy Thierry, Maritza Zavala

Questions?

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Inadequate PPE contributing to excessive pesticide exposures - Findings from SENSOR-Pesticides

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2013 Pesticide Handler Personal Protective Technology Stakeholders Meeting
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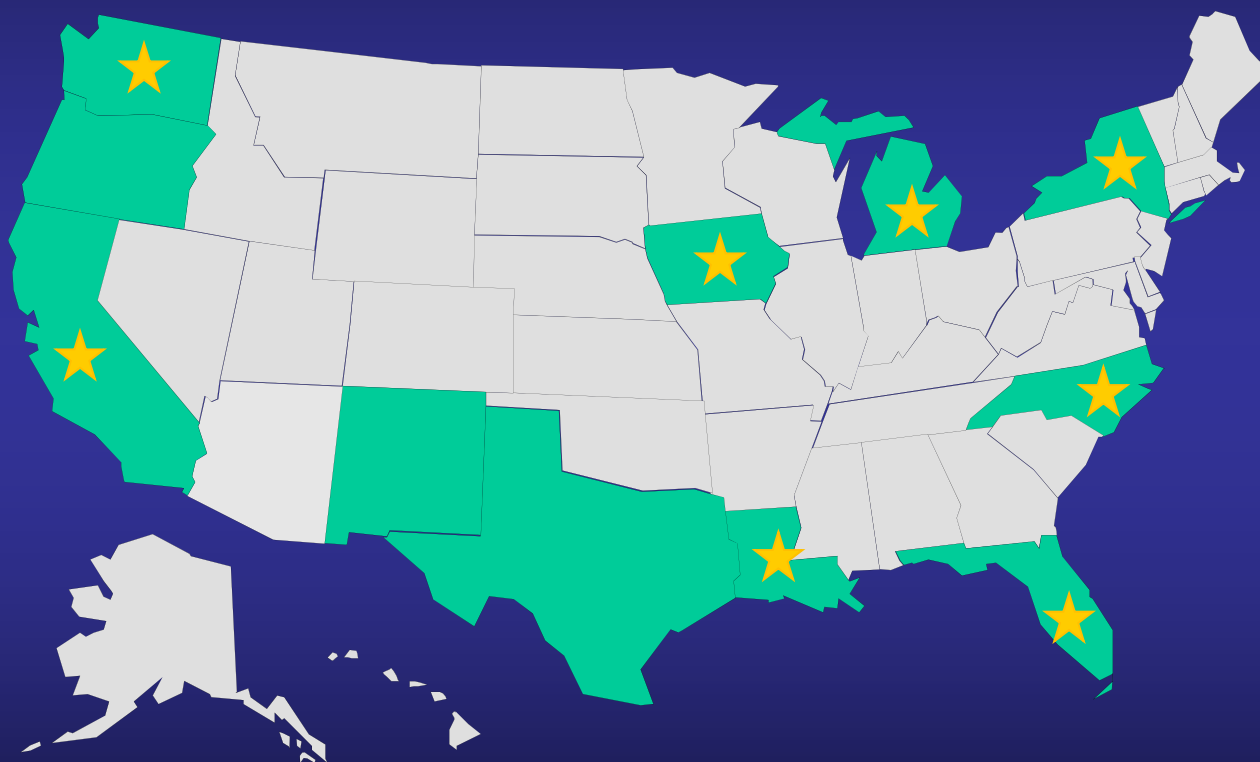


SENSOR-Pesticides Program

- State-based surveillance
- Began in 1987
- “Sentinel” case identification and follow-up
 - Timely opportunities for prevention/intervention
 - Directed to index case, co-workers and similar workplaces
- Standardized case definition, variables, and severity index
- Case ascertainment: use multiple sources
 - Including poison control center reports, workers' compensation records, state dept of agriculture
- Funded by NIOSH and EPA
- <http://www.cdc.gov/niosh/topics/pesticides/>



States participating in SENSOR-Pesticides (n=11)



■ SENSOR-Pesticides
★ Federally Funded





PPE Info Captured by SENSOR-Pesticides

- Before 2009
 - What PPE was worn
 - Respirator, gloves, goggles, chemically-resistant clothing, engineering controls
 - Was any PPE required by label or rule?
 - Didn't specify PPE type
- 2009 until present
 - What PPE was worn
 - Expanded the specific types of PPE (e.g. organic vapor vs particulate respirator, long-sleeved shirts, headgear, etc.)
 - Was PPE required by label or rule?
 - Specified by respirator, gloves, eye protection, other
 - Info used to determine factors contributing to pesticide exposure



Case Report



Acrolein

- Highly toxic herbicide (toxicity category I)
- First marketed in 1959
- Approved for use as an aquatic herbicide
 - Controls weeds and algae in irrigation canals
 - Prevents clogging and impaired water flow
- Also used as a biocide for oil well drilling equipment
- Mode of action
 - Highly reactive
 - degrades cellular structure by cross-linking proteins



Preventing acrolein exposure

- Used in closed system
- Acrolein exposure can occur:
 - During set up and break down of the application equipment
 - During visual inspection of the application equipment
- PPE required when performing above activities
 - Full-face air-purifying respirator
 - Chemical resistant gloves (butyl rubber)
 - Long-sleeved shirt, long pants, shoes and socks
- Required to complete training program
 - Before first use and then every 3 years



Case Report:

Recent Acrolein Exposure

- 57 y/o male aquatic herbicide applicator
 - Irrigation district in WA State
- Exposed in August 2012
- Investigating and attempting to repair a leak in the application equipment
- Wasn't wearing a respirator, goggles or gloves
 - Wearing only a short sleeve shirt, pants, shoes and socks



Application equipment

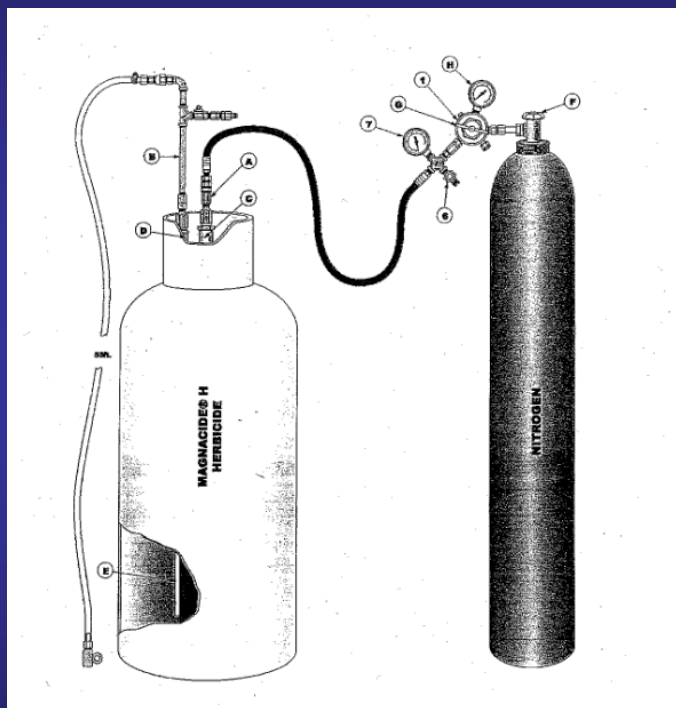


Figure from Baker Petrolite Corp;
Photos from WA State L&I.





Acrolein Case

PPE that should have been worn.



US EPA, Reregistration eligibility decision: acrolein, 2008.

PPE that was worn.





Medical course

- Immediately: burning throat and eyes
- Within 2 hours: throat tightness, difficulty breathing, inability to swallow, moderate phlegm production, vomiting, inability to talk due to dyspnea
- Admitted to the intensive care unit
 - Approximately 6 hours after exposure developed right facial droop
 - Approximately 48 hours after exposure he went into ventricular fibrillation and generalized seizure.
- Ultimately stabilized and discharged.



Recommendations

- Strict compliance with PPE requirements
- Annual Training
- Adherence to all operating procedures



PPE and Farmworkers with acute pesticide-related illness, 1998-2007

- All farmworker cases: 9% had PPE issues (lack of or inadequate PPE)
- Farmworker pesticide handlers: 27% had PPE issues (n=184)

Ill farmworker pesticide handlers with PPE issues (n=184)	
Required PPE not worn	132 (72%)
PPE not worn, requirement unknown or inadequate	43 (23%)
PPE in poor repair	9 (5%)

Kasner et al. Am J Ind Med 2012;55:571-583



PPE and Illnesses from exposure to pyrethrins/pyrethroids, 2000-2008

- All cases: 3% had PPE issues (lack of or inadequate PPE)
 - Occupational cases: 6% had PPE issues
 - Non-occupational cases: 1% had PPE issues

Specific type of PPE lacking, all cases (n=85)	
Eye Protection	34 (40%)
Hand Protection	24 (28%)
Respirator	12 (14%)
Other PPE	15 (18%)



Questions/Discussion



A powered air-purifying respirator, Tyvek suit and chemical-resistant gloves protect a worker using a thermal fogger in a greenhouse (courtesy of California EPA)

DISCLAIMER

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Fifteen-Minute Break



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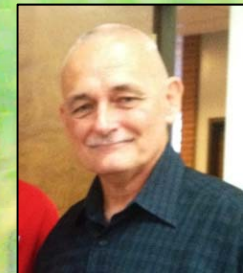
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